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STUDY OF FACTORS CAUSING DELAY OF COMPLETION OF CONSTRUCTION WORK BUILDING IN AIRLANGGA UNIVERSITY SURABAYA

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Abstract: Delay in a construction projects is a situation where a project can not be carried out or completed on time in accordance with the planned time. This study aims to (1) knowing the factors that are causing delays in the building project at the Airlangga University in Surabaya; and (2) knowing the rank factors that are causing delays in the work on the building project at the Airlangga University. Data collected by the questionnaire survey and interview which were distributed to the respondents that experienced individuals as the executor of the project of construction of the building at Airlangga University in Surabaya or the case study projects and has held positions as leaders of the activities, the project manager or field manager, consultant supervisor or consultant construction management. Data were analyzed using methods of factor analysis and multiple linear regression analysis with *SPSS* for data processing. After doing regression analysis with stepwise method obtained equation Y = -3.973 + 0.489 + 0.240 X8 X7 X5 + 0.428 + 0.314 + 0.200 X1 X2 X3 + 0.185 + 0.164 + 0.102 X4 X6, it is known that (1) the labour factor (X1), design (X2), the method of implementation (X3), a substance / material (X4), finance (X5), equipment (X6), work environment (X7), and managerial (X8) affect the delay of construction work on the building Airlangga University Surabaya. (2) after multiple linear regression analysis obtainedrank *the(rank)* the factors most dominant influence on the delay time of execution, respectively, are the factors of managerial (X8), work environment (X7), design (X2), finance (X5), labor (X1), a substance / material (X4), the method of implementation (X3), and equipment (X6).

Keywords: delay factor, ranking, the method of factor analysis, multiple linear regression

INTRODUCTION

Background

Time or schedule is one of the main objectives of a project. Delay will result in various forms of disadvantages such as additional costs, loss of opportunity products to enter the market, and others. Project delays are often the source of disputes and claims between the owner and the contractor, so the delay will be very expensive in value. The contractor will have a fine penalty in accordance with the contract and will also have thecosts *overhead* for the project are still ongoing. From the owner of project delays will impact revenue reduction due to delays in the operation of its facilities. A project will likely experience delays when planning and control is not done properly. Various things can happen in construction projects which can cause increased processing time, so that the completion of the project was delayed. Project delays that occurred at Airlangga University in Surabaya include:

1) Teaching Hospital project, Airlangga University Surabaya, 2) Project Faculty of Fisheries and Marine Airlangga University, and 3) Project Faculty of Pharmacy, Airlangga University.

Problems

From the above background, there are several problems that are important and need to be known and studied, as follows :

1. What are the factors that influence the delay in the completion of the project building in the Airlangga University ?
2. How to rank factors that affect the delays in the completion building project at the Airlangga University ?

Objective

This study aims to analyze the factors that cause delays in the work on the building project at the Airlangga University, Surabaya, and analyze ranking factors that are causing delays in the work on the building project at Airlangga University in Surabaya.

Limitations and Scope of the Study

In order for this research is more focus, it will be limited by the descriptions as follows:

1. The study was limited to the building project of the Faculty of Pharmacy (stage 1), the building of the Faculty of Fisheries and Marine Resources, as well as the building continued Teaching Hospital in the Airlangga University - Surabaya
2. The study was limited to the building project in the Airlangga University that has been built from 2014 to 2016
3. Respondents in this study are individuals with experience as executing on the building project at Airlangga University - Surabaya, and has held positions as project manager, field manager, coordinator / team leader Supervisory consultants, and / or coordinator / team leader Construction Consultants, field experts, and inspector / supervisor field.
4. Data were collected by means of questionnaires and debriefing.
5. This study did not aim to differentiate the respondent's domicile, but only to meet the planned sample size

LITERATURE

Basic Theory

1. Delay

Projects are experiencing delays. It could even be said to be almost 80% of the project has been delayed. It is worse, often repeated project delays on the aspects that influenced or influencing factor. Time is one of the constraints in Project Management in addition to the cost and quality. Project delays will have an impact on other aspects of the project. For example, the rising cost of effort to accelerate the work and increasing overhead costs of the project. Another impact is also often happens is loss of quality because the job is "forced" to do more quick than it should be allowed by some technical things are in order to reduce delays in the project.

2. Cause of Delay

According to Ahmed et al, 2003, the cause of the delay is divided into two categories, namely the factor of internal delay arising from the four parties involved in the procurement of construction services. These parties are owners, contractors, consultants, planners, and consultants supervisor. While external factors caused the delay beyond the last four parties including the government, suppliers, and the weather.

Ahmed et al (2003) and Alaghbari (2005) in the journal indicated the factors that are causing delays in construction projects in Malaysia include :

1) Factors caused by the contractor :
   a. Delay in delivery of materials to the project site
   b. Lack of material on the field
   c. Errors and defects employment
   d. Less skills and experience
   e. Lack of a work area on the field
   f. Low productivity
   g. Financial problems
   h. Lack of coordination
   i. Sub contractors have less expert
   j. Lack of equipment in the field
   k. Low management system
2) Factor caused by the consultant
   a. Lack of professional experts
   b. Lack of experience of the consultant
   c. Lack of experience and expertise in the field management and supervision
   d. Slow in the supervising and decision making
   e. Incomplete documents
   f. Slow giving orders
3) Factor caused by the owner :
   a. Not professional in the field of job
   b. Slow in taking decision
   c. Lack of coordination with contractor
   d. Changes contract (the change in plan and specification)
   e. Financial issues (late payments, financial difficulties, and economic issues)
4) External factors are:
   a. Unavailability of materials / material on the market
   b. Unavailability of equipment
   c. Poor weather conditions
   d. Bad location / area projects
   e. Bad economic situation (inflation, value of the currency to weaken, etc.)
   f. Change the rules of government
   g. Delayed mobilization

3. Type of Delay

According to Jervis, 1998 (in Suyanto, 2010), classifies delay into 4 types**,** namely: *execuseable delay, non-execuseable delay, compensable delay* and *concurrent delay*.

4. Impact of Delay

According to Lewis and Atherley (1996), the delay will have an impact on the original planning as well as on financial issues. Delays in the construction project will extend the duration of the project or increase costs or both. As for the impact of delay on the owner is the loss of potential income from the facilities built does not match the set time, while the contractor is the loss of an opportunity to put it's resources to other projects, increasing indirect costs due to increased expenses for employee salaries, equipment rental and reduce profits.

5. Accountability of delay

According to Ahmed et al, 2003 accountability delays associated with the performance of contractors who deserve appreciation or otherwise contractors should be charged and additional time to complete the project as a result of delays caused.

6. Overcome of delay

How to control the delays are :

1) Mobilizing additional resources.
2) Removing obstacles or other efforts to ensure that employment increased and brought back to the line of the plan.
3) Otherwise it may remain on the line of the original plan may be required revision schedule, which is then used as the basis for assessment of the progress of work in the next moment.

7. History Research

Research on construction project delays studies have ever been done. Some research as follows:

Suyanto (2010) conducted a research thesis on *Analysis of Causes of Delay in Completion of Building Project* (Application of Model Regression Model).

Alaghbari, et al (2007) conducted a study on *the significant factors causing the delay of building construction projects in* Malaysia.

Ahmed, et al (2003) conducted a study on *Delays in construction: A brief study of the Florida Construction Industry*.

Odeh, et al (2002) conducted a study on *Causes of construction delay, traditional contracts*.

METHOD

The research in this thesis includes research survey that is research taking sample from a population and using questionnaires as a data collection tool. In this study, data collection was done by collecting primary data, i.e. face to face with the respondent by means allocates several questions in the form of a questionnaire prepared by the researcher.

1. Flow Research Method

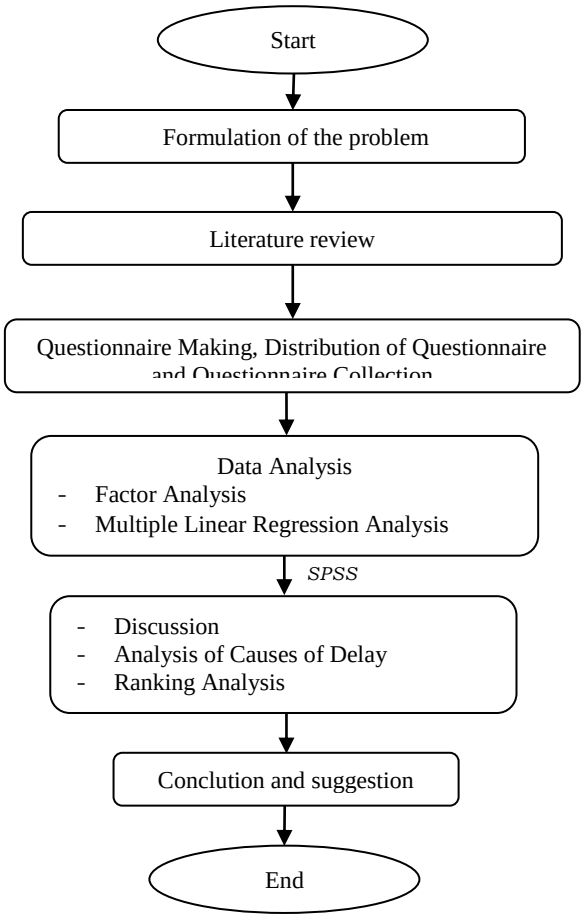


Figure 1. Flow of Research Method

2. Selection of Sampling

The sampling technique that used in this research was a purposive sampling (samples intended). Purposive sampling is a sampling technique with a certain consideration, commonly used in a qualitative research, which is determined by selecting the first unit (e.g. individual, group of individuals or institutions) that are based on specific goals related to research answers to questions.

3. Research Objective

Object of the study is to examine the factors that cause the delays in the implementation of the

construction of buildings at the Airlangga University, Surabaya.

4. Respondent

Respondent in this study are individuals who are experienced as the executor of the project of construction of the building at Airlangga University in Surabaya or the case study projects and has held position as a leader activities, the project manager or field manager, supervisor or consultant construction management consultant.

5. Primary Data

Primary data in this study a questionnaire respondent's answers to the questions that have been made by researchers filled out by the respondents.

6. Profile of Respondents

1) Profile of respondents
   a. profile of respondents were separated in accordance with the position of the respondent, namely: the project manager, field manager / site manager, project engineer, coordinator / team leader supervising consultant, or coordinator / team leader construction consultants, site engineer, and field supervisors.
   b. The experience of respondents are grouped into five (5), namely: experience 1 s / d 3 years, 3 s / d 5 years, 5 s / d 7 years, 7 s / d 10 years and more 10 years
2) Perceptions Respondents
   a. Respondent's answers to the question "whether in the implementation of building construction projects at the Airlangga University delayed namely: Yes / No".
   b. Respondent's perceptions of the factors causing delays in the completion of the building construction projects at the Airlangga University

7. Questionnaire Design

The questionnaire was designed in two groups:

1) Data respondent.
   In this section we collected data on the positions of respondents and respondents' experiences.
2) Data respondent's perceptions of the causes of delays in the project. This section aims to determine the extent to which the factors of project delays have an effect on the delay in the implementation of several projects of construction of the building at Airlangga University

8. Research Instrument

To make it easier to identify the variables to be studied, then the variables submitted to the respondents through the questionnaire as shown in the following table:

variable		Indicator	
X1	Labor	X1.1	lack of professional expertise appropriate field (consultants)
		X1.2	less skilled labor
		X1.3	labor Strikes
X2	Design	X2.1	ambiguity in the planning and specification
		X2.2	changes in planningand specifications
		X2.3	planning documentsincomplete
		X2.4	job changes (structural, architect, M / E, plumbing)
X3	Implementation method	X3.1	implementation of the phasing of work *(scheduling)* unfavorable
		X3.2	low productivity
X4	Materials	X4.1	delay in submission of material in the field (contractor)
		X4 .2	Delay in delivery of materials to the project site
		X4.3	material shortage in the field
X5	Finance	X5.1	delay in payment by the assignor *(owner)*
		X5.2	Additional work
		X5.3	Late payments by service providers (contractors) to suppliers (sub-contractors)
X6	Equipment	X6.1	delay in delivering equipment to the project site
		X6.2	existing equipment is often damaged whenproject implementation
X7	Working environment	X7.1	around the building's physical characteristicsproject
		X7.2	location / workspace poor / less representative

		X7.3	soil conditions (location)
		X7.4	bad weather
X8	Managerial	X8.1	delay in reaching a decision *(owner)*
		X8.2	Slow in oversight and decision-making (consultant)
		X8.3	delay in the change process from planning (consultants) at the time of execution of
		X8. 4	Mistakes to interpret drawings or specifications
		X8.5	late approval of shop drawings
Y	Time	Y1	Execution coincides work in the fasting month and Eid
		Y2	Pela ksanaan job near the end of closing of the financial budget
		Y3	implementedbuilding can not be used optimally

Figure 2. Classification Variable

9. Data Analysis Methods

The analysis methods include:

1) Determining the scores on the questionnaire statement, carried by the likert scale in which respondents were given the option then just choose the degree of agreement / disagreement on questions. The value / score as follows:
   - It has no effect rated 1
   - No Effect rated 2
   - Somewhat Influential rated 3
   - Influential rated 4
   - Highly Influential rated 5
2) Determine *ranking* on respondents
   To determine the ranking or rating of the factors causing delays in construction projects Airlangga University in general to the respondent's answers were analyzed with an index value of interest based on the average perception of respondents using the following equation (3.3):

$$Mean = I = \sum_{i=1}^{4} \frac{a_i \ X_i}{N} \text{..... (1)}$$

Where:

I = Interest Index
Xi = the frequency response of each perception
ai = the value on the perception of a given (1, 2,3,4,5)
N = number of data
the result of this interest will be generated index ratings of each of the factors causing delays in building construction project at the Airlangga University so it can be the main factor

3) data collected from the questionnaires are processed through the following phases:

a. editing data.
b. Coding (Coding the data).
c. Tabulating.

Analysis of the data in this study using SPSS for Windows which is among others include the testing instrument in the form of test items, validity and reliability, testing data is a test of factor analysis and multiple linear regression analysis

10. Testing Research Instruments

Research instruments plays an important role in quantitative research for data quality which is used in many ways determined by the quality of the instrument used. The instrument that is chosen, valid and reliable are requirements obtaining the result "valid and reliable".

1) Test Item

Testing the validity and reliability of a measuring instrument is only worth doing with collected grains have a question or a statement that has been tested and selected (Anwar, 2003). The formula of product moment correlation, namely:

$$r = \frac{n(\sum X_b X_t) - (\sum X_b)(\sum X_t)}{\sqrt{[n\sum X_b^2 - (\sum X_b)^2][n\sum X_t^2 - (\sum X_t)^2]}} \text{ ..... (2)}$$

Description:

R = product moment correlation coefficient between scores grains with a total score
n = number of samples
Xb = score grains;
Xt = total score

in relation to computing problems, the fewer the number of the questions or statements contained in the test will result in overestimates occur to the actual correlation. This condition is called spurious overlap (Guilford, in Widodo 2016; 41). As an illustration, if the number of the questions or statements in the test is less than 30 pieces in need of correction *spurious overlap* correlation of the results obtained. The formula used is as follows:

$$r_c = \frac{(r)(S_t) - S_b}{\sqrt{[S_t^2 + S_b^2 - 2(r)(S_b)(S_t)]}} \text{ ..... (3)}$$

Where:
rc = correlation coefficient corrected
r = coefficient of correlation early (before correction)
Sb = standard of deviation (score grain)
St = standard deviation (standard deviation) total score
grain questions or statements that elected (valid) is that having corrected correlation value (rc) is greater than or equal to ≥ 0.3 (Azwar, in Widodo 2016; 41).

2) Validity Test
Validity test using product moment correlation technique that is correlating the scores of items with a total score. Calculation of the correlation coefficient between the items with a total score will lead to over estimate of the actual correlation, it is in need of correction by using *part-whole.*If Spearman correlation> 0.05 (5%) means the item is valid, otherwise if spearmann correlation <0.05 (5%) means invalid (Azwar, in Widodo, 2016; 42).

3) Test Reliability
Test reliability is the degree of accuracy, precision or accuracy shown by a questionnaire measuring instruments said to be reliable or reliable if someone answers to questions are consistent or stable over time. Reliability is the extent to which the results of a measurement can be trusted and can provide relatively different results if conducted back to the same subject. Reliability testing is performed by calculating Cronbach alpha of more than> 0.60 (Anwar, 2003).

11. Classical Assumption Test
1. Normality Test
Normality The purpose of the test is to test whether a regression model, the dependent variable, independent variable, or both have nomal distribution or not.
2. Multi Collinearity Test
Multi Colinearity test was done to see if there are linkages between the perfect relationship between the independent variables. If in the test was founded a conclusion that the independent variables are mutually dependent, then the test can not be carried into the next stage could not be caused by the variable-determined regression coefficients can not be determined, and also the value of the standard error into infinity.

12. Method of Factor Analysis
Selection of factor analysis as a tool of analysis in this study, is because this study tries to find a relationship (interrelationship) some variables are mutually independent from one another, so that it can be made a collection of fewer variables than the number of initial variables that would be more easily controlled ,

13. Regression Analysis Method
Regression Analysis is an analysis that measures the effect of the independent variable (X) on the dependent variable (Y). Measurement of the influence of variables that involve more than one independent variable (X1, X2, X3, ..., Xn), used Multiple Linear Regression Analysis, called linear because any estimate of the expected value experiencing by increasing or decreasing in a straight line. Here are estimates of linear regression:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + \cdots + b_nX_n \text{.....(4)}$$

Where:
Y = dependent variable
X (1, 2,3, ..) = independent variable
a = constant value
b (1,2,3, ...) = the regression coefficient

14. Hypothesis Testing
1. Significance individal tests parameter (the test statistic t)
T statistic test basically shows how far the influence of the independent variable individually in explaining the variation of the dependent variable. The purpose of the t test was to test the individual regression coefficient. T statistics are calculated from the following formula (Kuncoro, 2004):

$$t = \frac{(b_i - 0)}{S} = \frac{b_i}{S} \text{.....} \quad (5)$$

Where : S = standard deviation, calculated from the root of the variance.
Variance or S2, is obtained from the SSE (Sum of Squares for Errors) divided by the number of degrees of greatness (degree of freedom), which is formulated as follows :

$$S^2 = \frac{SSE}{n-k} \quad \text{.....} \quad (6)$$

Where:
SSE = Number of degrees of error (Sum of Squares of error)
n = number of observations

k = Number of parameters in the model, includingintercept

2. Significant Simultaneous Test (Test statistic F)

F statistical test is basically indicate whether all the independent variables included in the model have jointly influence on the dependent variable. The null hypothesis (H0) that is to be tested is whether all the parameters in the model is equal to zero, or H0: b1 = b2 = bk = 0.

The F statistic is calculated from the following formula (Kuncoro, 2004: 82):

$$F = \frac{MSR}{MSE} = \frac{SSR/k}{SSE/(n-k)} \quad \text{.....} \quad (7)$$

Where:

SSR = sum of squares due to regression = Σ (yi - y) 2;

SSE = Sum of squares error = Σ (Yi - Yi) 2;

n = number of observations;

k = number of parameters (including intercept) in the model;

MSR = Mean squares due to regression;

MSE = Mean of squares due to error.

F value is derived from the ANOVA table (analyis of variance). TSS = SSR + SSE, meaning that the total sum of square (TSS) derived from variation regression (SSR) and the variation of error (SSE), which is divided the degrees of freedom each.

3. The coefficient of determination (R2)

The coefficient of determination (R2) essentially measures how far the model's ability to explain variations in the dependent variable. Formula calculate the coefficient of determination (Kuncoro, 2004: 84).

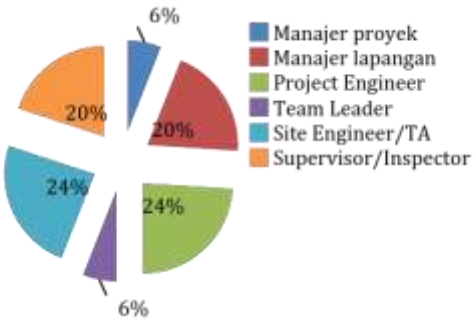
$$R^2 = \frac{(TSS-SSE)}{TSS} = \frac{SSR}{TSS} \quad \text{.....} \quad (8)$$

DATA ANALYSIS AND DISCUSSION

1. Result

Data from the questionnaires from the respondents can be seen from the discussion below:

a. Position of respondents



Profile of Figure 3. Position of respondents
Source: Results Analysis, 2017

Figure 3 shows the positions of respondents who participated in the questionnaire filling.

b. Respondent experience

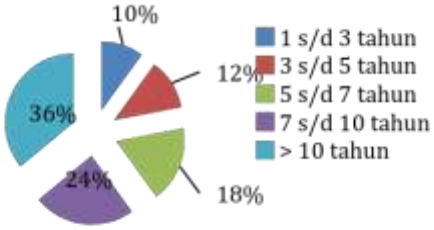


Figure 4. Diagram of Experience Profile of Respondents
Source: Results Analysis, 2017

Figure 4 shows the 50 respondents based on the above diagram can be seen that as many as 36% had experience of more than 10 years of work. With the experience of the expected answers which is given by the respondents even become more reliable and accurate so that the data obtained more reliably.

2. Research Instruments Testing

a) Test Item

No.	Item	Corrected Correlation (rc)	Description
1	X1.1	0.824	Selected
2	X1.2	0.772	Selected
3	X1.3	0.754	Selected
4	X2.1	0.744	Selected
5	X2.2	0.722	Selected
6	X2.3	0.660	Selected
7	X2.4	0.767	Selected
8	X3.1	0.801	Selected
9	X3.2	0.801	Selected
10	X4.1	0,729	Selected
11	X4.2	0.720	Selected

12	X4.3	0.784	Selected
13	X5.1	0.588	Selected
14	X5.2	0.584	Selected
15	X5.3	0.586	Selected
16	X6.1	0.510	Selected
17	X6.2	0.510	Selected
18	X7.1	0.756	Selected
19	X7.2	0.724	Selected
20	X7.3	0.766	Selected
21	X7.4	0,781	Selected
22	X8.1	0,782	Selected
23	X8 .2	0,812	Selected
24	X8.3	0,794	Selected
25	X8.4	0.744	Selected
26	X8.5	0.766	Selected

Figure 5. Test Results Item
Source: Analysis with SPSS calculation

b) Validity and Reliability

NO	VARIABLE		validity			Reliability	
			Correlation	P-Value	Valid	Cronbach's Alpha	Reliable
1	Labor	X 1.1	0.928 **	0.000	Valid	0.889	Reliable
2	Manpower	X1.2	0.898 **				
3	Employment	X1.3	0.888 **				
4	Design	X2.1	0.861 **	0.000	Valid	0.870	Reliable
5	Design	X2.2	0.847 **				
6	Design	X2. 3	0,806 **				
7	Design	X2.4	0,877 **				
8	Implementation method	X3.1	0,940 **	0,000	Valid	0.883	Reliable
9	Implementation method	X3.2	0.957 **				
10	Materials /	X4.1	0.890 **	0.000	Valid	0.864	Reliable
11	Materials / material	X4.2	0.872 **				
12	Materials /	X4.3	0.902 **				
13	Finance	X5.1	0,833 **	0,000	Valid	0.755	Reliable
14	Financial	X5.2	0.820 **				
15	Financial	X5.3	0.807 **				
16	Hardware	X6. 1	0,849 **	0,000	Valid	0.671	Reliable
17	Equipment	X6.2	0.887 **				
18	Work Environment	X7.1	0.869 **	0.000	Valid	0.889	Reliable
19	Work Environment	X7.2	0.843 **				
20	Work Environment	X7.3	0.874 **				
21	Work Environment	X7.4	0,879 **				
22	Managerial	X8.1	0.869 **	0.000	Valid	0.913	Reliable
23	Managerial	X8.2	0.888 **				
24	Managerial	X8.3	0.872 **				
25	Managerial	X8.4	0,833 **				
26	Managerial	X8.5	0.847 **				

** Correlation is significant at the 0.01 level (2 tailed)

Source: SPSS Analysis 21

Figure 6. Result of Validity and Reliability

3. Data Analysis and Discussion

1) Factor Analysis

KMO and MSA

No.	VARIABLE	Communality Value	Factor Loading	MSA	Eigen Value	KMO	Uniformity Total	Sign. Statistics Barlett's
First	Labor X1.1	0.917 0.688 2.454						0.000
2	Manpower X1.2	0.695	0.834	0.750		0.735	0.841 81.817%	
3	Employment X1.3	0.654	0.809	0.778				
4	Design X2.1	2.878 0.830	0.817	0.822				0.000
5	Design X2 .2	0.622	0.789	0.834				
6	Design X2.3	0.507	0.712	0.872			0.667 71.960%	
7	Design X2.4	0.718	0.847	0.802				
8	Implementation method X3.1	1.801	0.895	0.500				0,000
9	Implementation method X3.2	0.801	0.895	0.500		0.500	0.801 90.069%	
10	Materials / X4. 0.6430. 748 2.368 0.729		0.802					0,000
11	Materials / X4.2	0.620	0.791	0.758			1 78.918%	
12	Materials / X4.3	0.790	0.889	0.689				
13	Financial X5.1	67.267	0.717	0.693				0.000
14 %	Financial X5.2	0.504	0.710	0.697	2.018	0.695	0.514	

15	Financial X5.3	0.508	0.713	0.695				
16	Equipment X6.1	0.7131.51075.488		0.500		0.500	0.509	0.000
17 %	Equipment X6.2	0.509	0.713	0.500				
18	Work Environment X7.1	0.818 0.811 3.004 0.808						0,000
19	Working Environment X7.2	0,600	0.774	0.835				
20	Work Environment X7.3	0.688	0.830	0.807			0.669	75.097%
21	Work Environment X7.4	0.718	0 ,847	0.785				
22	Managerial X8.1	3.716	0.827	0.879				0,000
23	Managerial X8.2	0.742	0.861	0.885				
24	Managerial X8.3	0.705	0.840	0.886		0.888	0.684	74.328%
25	Managerial X8.4	0.616	0.785	0.892				
26	Managerial X8.5	0.651	0.807	0.900				

Figure 7. Results of factor analysis for variable
Source: Analysis of SPSS 21

2) Multiple linear regression analysis (stepwise method)

variable		**coefficient β**	**t**	***p-value***	**Description**
Constants		-3.973	-11.513	of 0.000	Significant
Labor	X1	0.200	3.378	0.002	Significant
Design	X2	0.314	4.861	0.000	Significant

Implementation method	X3	0.164	2.888	0.006	Significant
Materials /	X4	0.185	3.362	0.002	Significant
Financial	X5	0.240	2.965	0.005	Significant
Equipment	X6	0.102	2.126	0.040	Significant
Work Environment	X7	0.428	7.462	0.000	Significant
Managerial	X8	0.489	7.616	0.000	Significant
A	= 0.05				
R^2	= 0.92				
R	= 0.96				
F-count	= 62.557				
F-table (0:05, 8, 41)	= 2.17				
p-value	= 0.000				
t-table (0.05,41)	= 2.020				

Figure 8. Regression Analysis summary
Source: Analysis of the results of calculation of SPSS 21

Based on the Figure 8 above shows that all independent variables have a significant value. Interpretation of the regression model with stepwise method obtained by figure 8 above is as follows:

Y = -3.973 + 0.489 + 0.240 X8 X7 X5 + 0.428 + 0.314 + 0.200 X1 X2 X3 + 0.185 + 0.164 + 0.102 X6 X4

CONCLUSION AND RECOMMENDATION

1. Conclusion

Results of research and discussion can be concluded as followed were:

a) factors are causing delays in the implementation time is labor (X1), design (X2), the method of implementation (X3), a substance / material (X4), finance (X5), equipment (X6) , work environment (X7), and managerial (X8) effect together to delay the execution time of the stepwise method of regression equation:

Y = -3.973 + 0.489 + 0.240 X8 X7 X5 + 0.428 + 0.314 X2 + 0.200 X1 + 0.164 X3 + 0.185 + 0.102 X6X4

andbased F test showed that simultaneously all the factors causing delays in the execution time of the $F_{count} = 62.557 > F_{table} = 2.170$.

However, based on the t test partial factors that significantly affect the delay time of execution with the results of the coefficient $\beta < t_{table} = 2.020$ is the factor managerial (X8) with coefficient β of 0.489 and $_t$ = 7.616, work environment factors (X7) with coefficient β of 0.428 and$_t$ = 7.462, factor Design (X2) with coefficient β of 0.314 and $_t$ = 4.861, financial factors (X5) with coefficient β of 0.240 and $_t$ = 2.965, labor factor (X1) with coefficient β of 0.200 and $_t$ = 3.378, the factor of material / substance (X4) with coefficient β of 0.185 and $_t$ = 3.362, factor method of implementation (X3) with coefficient β of 0.164 and = $_t$ = 2,888 and factors X6 equipment) with a value of β coefficient of 0.102 and $_t$ = 2.126.

b) The dominant factor influencing delay the implementation time in a row is a managerial factor (X8) with indicator (X8.3) delayed the change of the planning process; work environment factors (X7) with the indicator (X7.1) the physical characteristic of the building around the project; design factors (X2) with indicator (X2.2) changes in the plans and specifications; financial factors (X5) with additional work indicators (X5.2); labor factor (X1) with the indicator (X1.2) less skilled labor; factor / material (X4) with indicator (X4.3) material weaknesses in the field; factor method of implementation (X3) with indicator (X3.1) implementation phasing of the work (scheduling) is not good; and factors equipment (X6) with indicators of delays in delivery of equipment to the project site.

2. Suggestion

a) providers of construction services to implement the project, should immediately respond to a change in design to execute, attentiate to the schedule start work, anticipating the changes in the design of the field which may result in additional work, evaluate the competencies of workforce capabilities needed in the implementation of the work, sufficient the supply of stock material in the field, understand the schedule for phasing implementation and the capability of the use of work equipment in accordance with the function and capacity refers to the roadmap and specification.

b) In a subsequent study is expected to complete a sample test on the construction project at the Airlangga University annually, in order to know and anticipate the factors causing delays in the next job. And add other variables such as the duration of implementation and the relationship with government to develop this research.

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